29. The Affinities of the Antarctic Wolf (*Canis antarcticus*).

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(Text-figures 70–74.)

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The story of *Canis antarcticus* has been told by Darwin *, by Hamilton Smith †, and more recently by Mr. Rupert Vallentin ‡ from first-hand information, and by several authors indebted either to Darwin's or Hamilton Smith's account, or to the accounts of travellers who visited the Falklands before Darwin's time. References to the literature down to 1890 may be found in Mivart's 'Monograph of the Canidæ,' published in that year. According to Mr. Vallentin, *Canis antarcticus* became extinct in 1876, without leaving a trace of its former existence in the Falkland Islands; and since all the known material of the species appears to be preserved in London and Paris, I have attempted to supply the want expressed by Allen § by figuring a skull of one of the specimens in the British Museum. I have not, however, given detailed measurements of the skull, because these may be found in Mivart's monograph and in the paper by Huxley mentioned below.

Some six or seven years ago, when trying to identify some South American dogs exhibited in the Zoological Gardens, I took the incidental opportunity of looking at the skulls of a few of the species of Neotropical Canidæ contained in the British Museum, to learn, if possible, something of their affinities to one another and to the better known species inhabiting North America and the countries of the Old World. Amongst the species examined were *Canis antarcticus*, the so-called Wolf of the Falkland Islands, and *Canis latrans*, the Coyote or Prairie Wolf, which ranges roughly from Canada to Mexico. The examination was made without any intention on my part of adding to the literature of the subject, with which I was only acquainted in a very general way; and after satisfying myself that *C. antarcticus* was related to certain Neotropical forms, of which *C. thous* (= *cancrivorus*) may be taken as an example, and that the affinities of *C. latrans* lie with some of the so-called jackals and wolves of the Old World, I was contented to let the matter rest.

* In Waterhouse's Zool. of H.M.S. 'Beagle,' Mammalia, p. 7, 1839.

† In Jardine's Nat. Libr., Mammalia, ix. p. 252.

‡ Manchester Memoirs, xlviii. p. 45, 1904. This paper is quoted by Mr. Lydekker, and some of the interesting and puzzling points connected with *C. antarcticus* are discussed in 'The Field,' Oct. 1, 1904.

§ Rep. Princeton Univ. Exped. Patagonia, iii. pt. 1, p. 153, 1905.

But in the summer of 1912, I received for review from the Editor of 'Nature' a copy of Dr. R. F. Scharff's volume, 'Distribution and Origin of Life in America,' 1911; and when I found it definitely stated therein that *C. antarcticus* is closely related to *C. latrans*, and when I saw the obvious difficulties in which Dr. Scharff was involved in his attempt to explain, on geographical grounds, this singular affiliation, I ventured to reassure him by remarking, in effect, that his belief was devoid of morphological foundation.

Now, an author who compiles a volume on zoology of the size and scope of the 'Distribution and Origin of Life in America' cannot be expected to verify all the statements of earlier and contemporary writers. Nor in the present instance could Dr. Scharff be justly criticised for not travelling to London to examine for himself the preserved material of *C. antarcticus*, of which, I take it, there is no specimen in Dublin. Very naturally, therefore, he trusted to the verdict of others, and promptly replied to my remark with a request for my reasons for making it. But since I could not ask the Editor of 'Nature' to give me the necessary space for justifying the statement I had made, I pledged myself to do this elsewhere, and the matter that follows is an attempt to redeem that promise.

The acknowledged source of Dr. Scharff's opinion about the mutual affinities of *C. antarcticus* and *C. latrans* was the following passage in Mr. Lydekker's 'Geographical History of Mammals,' 1896:—"Of the two indigenous mammals, the most remarkable is the Falkland Island Wolf (*Canis antarcticus*), which differs markedly from all the Canidæ of the mainland and is apparently closely allied to the North American Coyote (*C. latrans*)" (p. 140). I therefore wrote and asked Mr. Lydekker if he would kindly tell me his reasons for this conclusion, and he informed me that he took it from Prof. Huxley's classic paper upon the cranial and dental characters of the Canidæ, published in the 'Proceedings' of this Society, 1880, pp. 238–288. Upon looking up this paper I find the following passages referring to the two species under discussion and bearing upon the question at issue:—

(1) . . . . . But sometimes there is a well-defined though comparatively narrow sagittal area, from the centre of which a low sagittal crest rises. This is well seen in some Jackals, and especially in *C. antarcticus* (p. 250).

(2) In the large size of the upper molars . . . . . *C. antarcticus* presents the closest approximation to some specimens of *C. latrans* (p. 266).

(3) From the range of variation of *C. cancrivorus* it can hardly be doubted that the examination of more extensive materials will prove the existence of an uninterrupted series of gradations from *C. vetulus* to *C. antarcticus* and *C. jubatus* (p. 266).

(4) Seven crania of *C. latrans*, when measured, exhibit a considerable range of variation, though probably less than a larger series would show. But, as they are, I must confess myself unable to find an important break in the

series of gradations of cranial and dental structure between *Canis latrans* and *C. antarcticus* on the one hand, and *C. latrans* and *C. occidentalis* on the other. . . . . I may further remark that I can discern no difference of the slightest importance between skulls of *C. latrans* and those of some of our domestic dogs (pp. 272–273).

(5) In the genus *Canis* we have . . . . . as a lowest section the species of the *C. cancrivorus* and *C. vetulus* type (answering pretty much to the Aguarra dogs of Hamilton Smith), the Sacaline section (*C. aureus*, *C. anthus*, *C. mesomelas*, *C. antarcticus*, *C. latrans*), and the Lupine section (*C. lupus* and all its varieties) (p. 286).

Whether these paragraphs justify Mr. Lydekker's statement * that *C. antarcticus* differs markedly from all the Canidæ of the mainland of South America and is apparently closely allied to *C. latrans*, and Dr. Scharff's extension of this to the effect that *C. antarcticus* is certainly closely related to *C. latrans*, must be left to individual judgment.

Paragraph 1 merely points out one resemblance between *C. antarcticus* and some jackals. Paragraph 2 similarly points out one resemblance between the two species, but contains no suggestion of affinity between them. Paragraph 3 may be interpreted as suggesting affiliation between the extreme forms of South American Canidæ represented by *C. vetulus* and *C. jubatus*, with *C. antarcticus* lying midway between them. Paragraph 4 is more precise and states that there is no important structural break between *C. antarcticus* and *C. latrans*, and that the latter similarly intergrades with *C. occidentalis* and *C. familiaris*. Paragraph 5, on the contrary, definitely associates *C. antarcticus* and *C. latrans*, and at the same time severs the former from the group typified by *C. vetulus* and the latter from the group typified by *C. lupus* or *occidentalis*, an arrangement not easy to reconcile with the views expressed by paragraphs 3 and 4.

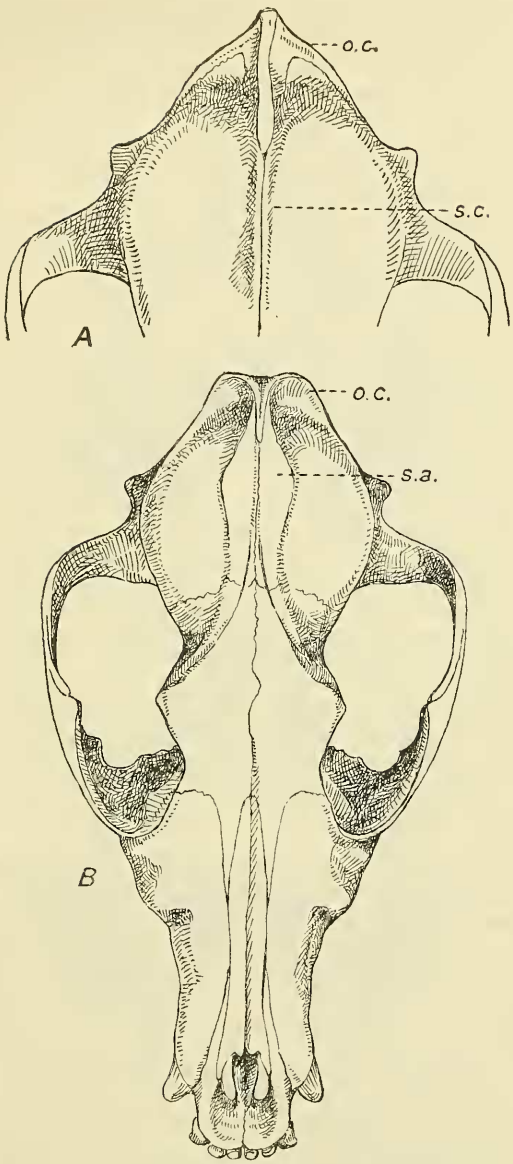
After reading Prof. Huxley's paper rather carefully for enlightenment on this subject, I must confess that I cannot form any clear idea as to his views of the affinities of the species he discussed, except in a broad sense.

If the substance of paragraphs 4 and 5 afford some justification for Mr. Lydekker's declaration respecting the relationship between *C. antarcticus* and *C. latrans*, it must be admitted that paragraph 3 does not support the contention that *C. antarcticus* is quite unrelated to the species of Canidæ inhabiting the South American mainland. However that may be, the conclusions forced upon me by the examination of five crania of *C. antarcticus* and twelve of *C. latrans* † in the British Museum and

* In the article in 'The Field' (Oct. 1, 1904), above referred to, Mr. Lydekker evinces less assurance on these points; but he evidently could not bring himself to reject the authority of Huxley's opinion.

† I use this term in its old-fashioned and broad sense, disregarding the species or subspecies recently dismembered from *C. latrans* by American systematists.

Text-fig. 70.



A. Dorsal view of posterior part of skull of *Canis latrans*.
B. Dorsal view of skull of *C. antarcticus*.

o.c., occipital crest ; *s.c.*, sagittal crest ; *s.a.*, sagittal area.

The figures of the skull of *C. latrans* are from a specimen (♂) in the British Museum from Assiniboia (2.8.22), and those of *C. antarcticus* from a specimen in the British Museum (69.2.24.3).]

the Museum of the College of Surgeons are:—(1) that *C. antarcticus* and *C. latrans* are not closely allied; (2) that *C. antarcticus* is more nearly related to the *C. thous* (= *cancrivorus*) group of South American Canidæ than to *C. latrans*; (3) that *C. latrans* must be affiliated with such Old World species as *C. pallipes*, *C. lupaster* and *C. anthus*, and not with *C. antarcticus*. The first and third of these conclusions are borne out by the external characters of the two species concerned. My reasons for these conclusions are as follows:—

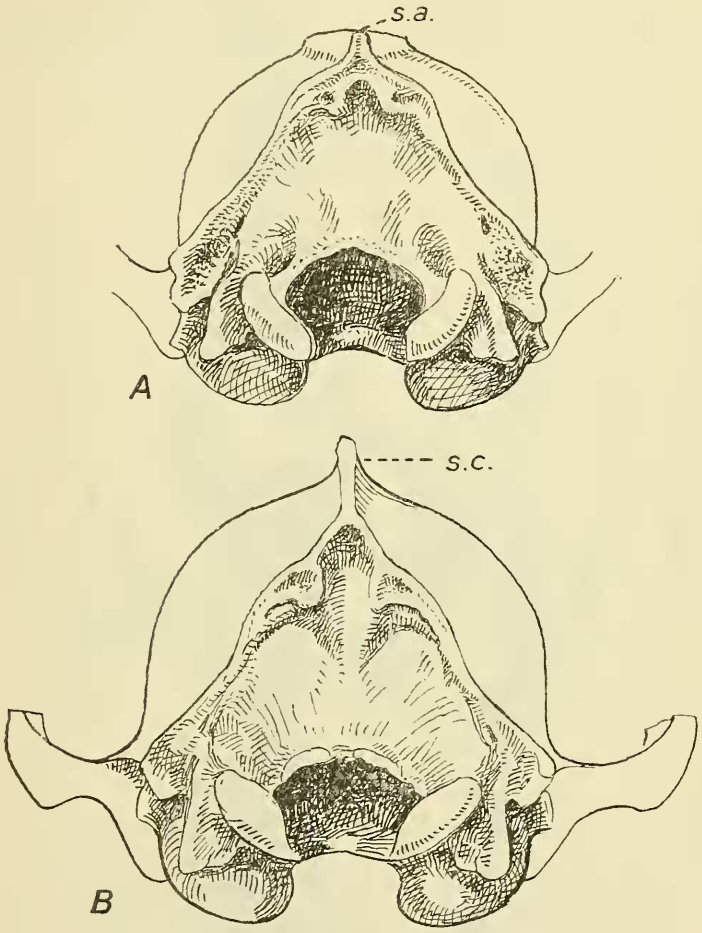
The sagittal area and sagittal crest.—As Huxley and Mivart have shown, the skull of *C. antarcticus* has a well-marked lyriform sagittal area which, according to the evidence of available crania, persisted throughout life, although in one of the three specimens in the British Museum it is decidedly narrower than in the two others. In the skulls of *C. latrans* that I have seen there is no distinct lyriform sagittal area, but in adult skulls there is a median cariniform sagittal crest varying in height with age. Even in two young skulls, in both of which the sphenoidal and occipital sutures are open, while one still retains a milk canine behind the permanent canine, there is no lyriform sagittal area. The significance of this depends upon the fact that the young of many species of Canidæ of corresponding age or older show a stronger or weaker lyriform area corresponding with the sinuosity of the upspreading temporal muscle on each side, although in the young of no species of dog in which the adult possesses a cariniform sagittal crest does the lyriform sagittal area show, I believe, the development and definition it exhibits in the adult of *C. antarcticus*. However that may be, if *C. antarcticus* and *C. latrans* were closely related, we should at least expect to see a well-defined lyriform sagittal area in the skulls of subadult individuals of *C. latrans* killed before the temporal muscles had reached the summit of the cranium. But, as has been said, this area is remarkable for its indistinctness in immature skulls of that species.

The occipital crest.—In *C. antarcticus* the occipital crest, when viewed from above, is transversely truncated and not angular; when viewed from the side it only overhangs the vertical portion of the supraoccipital to a small extent; and when viewed from behind it forms a truncated angle. In *C. latrans* this crest is angularly produced backwards in the middle line, overhangs the occipital area to a much greater extent, and is more acutely angled from behind. It varies in shape and development in this species, but never, so far as I have seen, resembles that of *C. antarcticus* (text-figs. 70 & 71).

The malar bone.—In *Canis antarcticus* the anterior portion of the malar bone is marked by a strong masseteric ridge traversing approximately the middle of its outer surface; the inferior edge of the bone close to the maxilla is expanded convexly to afford additional support to the masseter muscle; its upper edge close to the maxilla is somewhat out-turned, forming a very appreciable hollow on the subjacent portion of the maxilla above the first

molar tooth. In *C. latrans* the masseteric crest of the malar is low down on its external surface, the inferior edge of the bone is scarcely at all expanded, so that the area for the attachment of

Text-fig. 71.

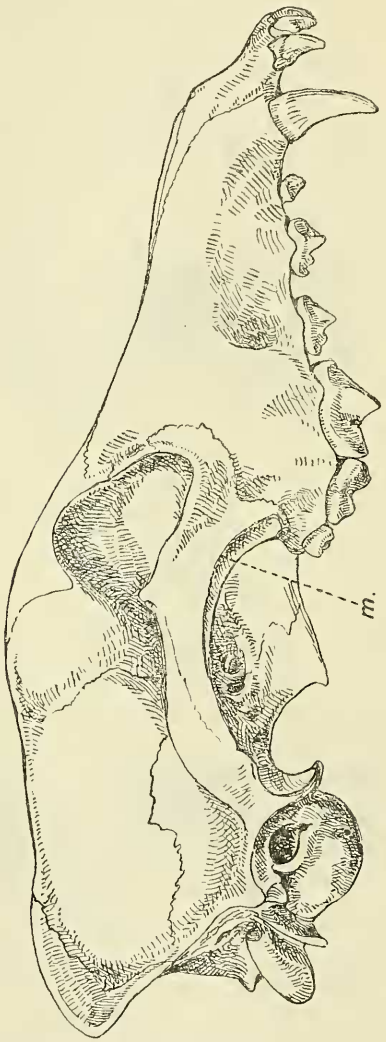


A. Occipital region of skull of *Canis antarcticus*.
B. Occipital region of skull of *C. latrans*.
s.a., sagittal area; *s.c.*, sagittal crest.

the masseter is much narrower than in *C. antarcticus*, and the upper edge of the malar is not noticeably out-turned, so that the hollow on the maxilla beneath it is less pronounced (text-figs. 72 & 73, pp. 388–9).

Upper carnassial tooth.—In *C. antarcticus* the antero-external

cusp has the front border more rounded and the very fine crest that runs down it is defined on the inner side by a very indistinct groove. The antero-internal cusp is wider and rises further back and has no distinct little crest running inwards towards the



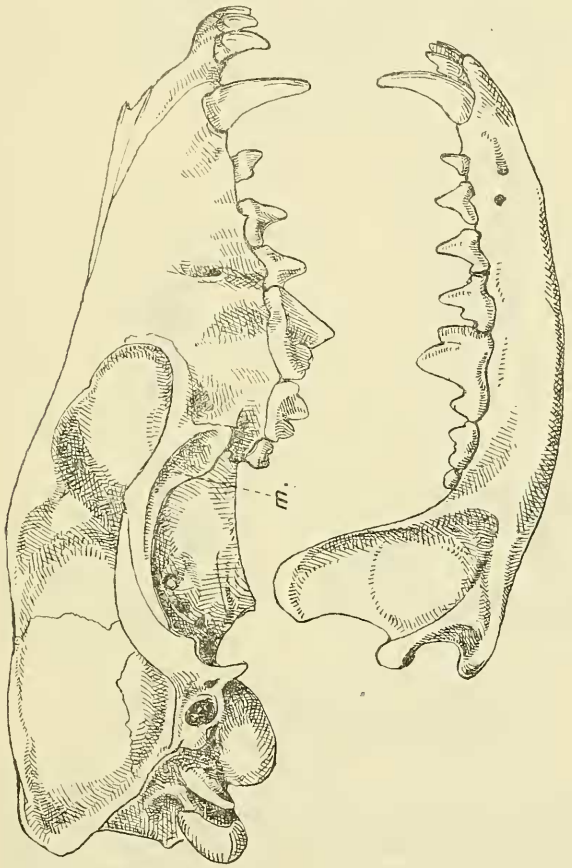
Text-fig. 72.

Side view of skull of *Canis latrans*. *m.*, masseteric ridge or malar bone.

antero-external cusp. In *C. latrans* the crest traversing the anterior edge of the antero-external cusp is more pronounced and is defined by a distinct groove, the two combining to make the edge of this cusp more cutting than in *C. antarcticus*. The

antero-internal cusp is narrower and set distinctly more forwards than in *C. antarcticus*, and there is a delicate crest running along its surface towards the base of the antero-external cusp (text-fig. 74, A, B, p. 390).

Lower carnassial tooth.—The main cusp is higher and more pointed in *C. antarcticus* than in *C. latrans*, and the little cusp at its base on the inner side is much lower, so that it stands on a little higher level than the internal cusp of the talon. In *C. latrans*



Text-fig. 73.

Side view of skull of *Canis antarcticus*. *m*, masseteric ridge or malar bone.

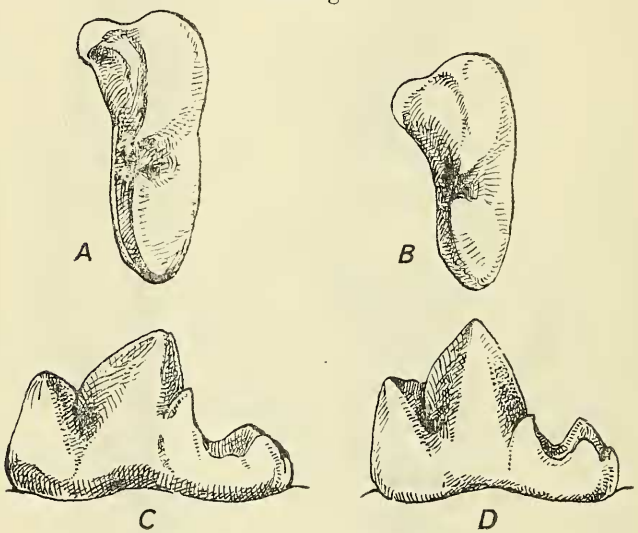
this cusp is comparatively high up the main cusp of the tooth and is considerably above the inner cusp of the talon (text-fig. 74, C, D, p. 390).

There are other minor differences both in the skull and teeth. The palatine bones, for instance, extend farther forwards with relation to the upper carnassials, and the margin of the posterior nares is also farther forwards with relation to the posterior molars in *C. latrans* than in *C. antarcticus*: the incisor teeth are

smaller and the crowns of the cheek-teeth are higher with relation to their breadth in *C. antarcticus* than in *C. latrans*. But apart from these, the principal differences mentioned above are quite sufficient to disprove the claim that the two species are closely related. According to modern standards of classification they are subgenerically, if not generically, distinct.

But the characters above described tell us more than that. Taking *C. latrans* first, it is obvious that in the cariniform sagittal crest, the angularly produced occipital crest, the position of the masseteric ridge on the malar bone, and in the points alluded to in connection with the upper and lower carnassials, the species falls into line with the large wolves like *C. occidentalis* and *lupus*,

Text-fig. 74.



A. Vertical view of upper carnassial of *Canis latrans*.
B. Vertical view of upper carnassial of *C. antarcticus*.
C. Internal view of lower carnassial of *C. latrans*.
D. Internal view of lower carnassial of *C. antarcticus*.

and with *C. pallipes* and *C. lupaster*, which, according to fancy, may be called large jackals or small wolves. These resemblances explain Mivart's dismissal of the cranial and dental characters of *C. latrans* with the remark, "The skull possesses no distinctive characters, nor have we been able to detect any in the shape of the teeth."

On the other hand, the skull of *C. antarcticus*, with its lyriform sagittal area and truncated occipital crest, agrees in the main with the skulls of certain species or subspecies of South-American dogs in the British Museum labelled *C. thous* (=*cancrivorus*), *rudis*, *sclateri* (=*microtis*), *parvidens*, *urostictus*, *gracilis*, and *fulvipes*. And in the skull of a dog, perhaps referable to *C. gracilis*, which

came from Mar del Plata and died in the Gardens, the above-described crests on the upper carnassial are not better developed than in *C. antarcticus*, and the masseteric ridge on the malar bone shows a decided approximation to the condition seen in that species. This latter character is still better marked in the skull of another South-American dog, the exact locality of which is unknown, but which was a different species* from the Mar del Plata example, and the crests on the carnassial exhibit the same feebleness of development. But it may be noted that in both these skulls the positions of the cusps on the upper and lower carnassials are more *latrans*-like than *antarcticus*-like, so that in this respect at least they serve to bridge over the difference between those two species; a fact in keeping with the idea that *C. antarcticus* is a specialised form of the group of South-American dogs above alluded to, but specialised in a direction away from that taken by *C. latrans* and its allies.

The external characters of *C. antarcticus* and *C. latrans* also afford no justification for the claim of close relationship between them. In the first place the ears of *C. antarcticus* are very small, smaller indeed comparatively, I believe, than in any wild species of the dog family, with the exception perhaps of *C. sclateri*, *C.* (*Nyctereutes*) *procyonoides*, and *Vulpes* (*Alopex*) *lagopus*. In *C. latrans*, on the contrary, they are as large as in most, at all events, of the species of *Canis*. An idea of their length in the two species may be gathered from the measurement of a specimen of each of approximately the same size given by Mivart, the ear of *C. antarcticus* being 6·5 cm. (= about $2\frac{1}{2}$ inches) and that of *C. latrans* 14 cm. (=about $5\frac{1}{2}$ inches), or more than twice as long. It may be added that the measurement of 2 inches 9 lines assigned by Waterhouse to the ear of *C. antarcticus* confirms Mivart's statement.

As regards colour *C. latrans* varies from grey to greyish fawn, mixed with black above, and shows the characteristic clouded or patchy coloration caused by the running together of the bands of the individual long coarse hairs of the back and sides seen in so many of the so-called wolves and jackals. One of these long coarse hairs, pulled at random from a skin, measured about 3 inches long, the black tip being $\frac{1}{2}$ inch (12 mm.) and the whitish area below it 1 inch (25 mm.). The whole of the ventral surface from the chin to the root of the tail is usually white or whitish, and always apparently markedly paler than the back and sides, though sometimes the continuity of the light tint is interrupted on the throat by an infusion of fawn. There is no dark patch above the hock on the hind leg, and the tail matches the back approximately in colour throughout, the tip and the gland-spot being blacker than the rest.

In *C. antarcticus* the coat is thick and soft, and comparatively short, with none of the long coarse hair seen in *C. latrans*. One

* The South-American dogs of this group are in such a systematic muddle that it is very difficult to identify specimens without a complete revision of the whole series.

of the longish hairs pulled at random from the back measured only $1\frac{1}{2}$ inches (37 mm.) in length, the dark apical tip being $\frac{1}{4}$ inch (6 mm.) and the pale band below it $\frac{1}{8}$ inch (3 mm.) in length. The prevailing colour of the body is brown, relieved by the fine speckling due to the narrow pale band on the individual hairs just described. The lower side is white only on the posterior portion of the belly and on the upper end of the throat, the chin and lower jaw being white stained with a fuscous tint. Apart from the areas described the ventral surface is brownish. There is, moreover, as Mivart said, a fuscous patch above the hock of the hind leg and the tail is particoloured, its basal portion being like the back, its tip white, and the intermediate area blackish, the colour of this area gradually blending proximally with the brownish basal portion, but being quite black distally and sharply defined from the white terminal area.

Perhaps it may rightly be claimed that these differences in the length of the ears and in colour do not count for much in themselves. That may be so. Nevertheless, if *C. antarcticus* and *C. latrans* were only known from their skins, it is quite certain that the latter would be placed in the same category with such species as *C. pallipes* and *C. lupaster*, and that *C. antarcticus* would be excluded therefrom. The latter would be difficult to classify; but there is one significant colour-feature connected with the species. This is the presence of the dark patch above the hocks; and the interest of this lies in the circumstance that it is a very common feature in various species of the smaller South-American dogs and occurs in some of the species of *Vulpes*, like *V. chama* *.

There is one other little point that may be referred to. Darwin says he was informed that the cries of *C. antarcticus* resembled those of the South-American species *C. azaræ*. I have never heard *C. azaræ* bark or howl, but the keeper in the Gardens informs me that examples of wild dogs from Mar del Plata and Cordova, which are closely allied to and perhaps only racially distinct from *C. azaræ*, bark after the manner of foxes. On the whole, however, they are silent dogs in captivity, and, like the foxes, never succumb to the temptation of joining in the howling concerts in which the dingos, jackals, prairie wolves, and large wolves in the Gardens indulge, and which they seem unable to resist contributing to. Personally I believe that voice in mammals is often a good guide to affinity; and, in the present case, the voices of *C. antarcticus* and *C. latrans* bear out my opinion of the relationship of these species to others, shown by structural characters.

Finally, if the conclusions above put forward are correct, Huxley's classification, expressed in par. 5 (p. 384), must be emended by transferring *C. antarcticus* to the lowest section of

* The presence of this patch in some of the primitive Canidæ is well worth more attention than it has received. I do not know what it may mean, any more than I know what the pale area behind the shoulder, observable in many Canidæ, both wild and domesticated, may mean.